KANSAS-LOWER REPUBLICAN BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: Mill Creek Watershed
Water Quality Impairment: Sediment Impact on Aquatic Life

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Lower Kansas **HUC 8:** 10270104

Waterbody: Mill Creek Watershed **HUC 11:** 170

County: Johnson **Drainage Area:** 70.8 miles^2

Main Stem Segment: 39, starting at confluence of Kansas River, headwaters in Johnson County near Olathe

Designated Uses: Expected Aquatic Life Support.

1998 303d Listing: Table 2–Stream Segments Identified by Biological Monitoring

Impaired Use: Expected Aquatic Life Support on Segment 39

Water Quality Standard: Total Suspended Solids--Narrative: Suspended solids added to surface waters by artificial sources shall not interfere with the behavior, reproduction, physical habitat or other factor related to the survival and propagation of aquatic or semi-aquatic or terrestrial wildlife. (KAR 28-16-28e(c)(2)(D)).

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 303d: Not Supporting Aquatic Life

Monitoring Sites: Station 251 near Shawnee

Period of Record Used: Stream Chemistry: 1985–1998
Biological Monitoring: 1993--1996

Flow Record: Calculated from Blue River near Stanley (USGS Station 06893080; Recorded Daily Data 1974 - 1997) by proportional drainage

Current Condition:

Parameter	Historical Average (1993 - 1996 for biological data)
Macroinvertebrate Biotic Index (MBI)	5.42 (4.56 - 6.13)
% Ephemeroptera, Plecoptera, and Trichoptera (EPT) Taxa	14.14 (8.57 - 20.00)
Total Suspended Solids (TSS)	42.2 mg/L (1.0 - 580 mg/L)

Percent EPT taxa and total suspended solid concentrations need to be analyzed to address the sediment/biological impact impairment. The MBI index may also be examined; however it is not as good of an indicator as percent EPT taxa. The EPT index is the proportion of aquatic taxa present within a stream belonging to pollution intolerant orders; Ephemeroptera, Plecoptera and Trichoptera (mayflies, stoneflies and caddisflies). Higher percentages of total taxa comprising these three groups indicate less pollutant stress and better water quality. Typically, these macroinvertebrates utilize a coarse substrate in the stream for habitat. Elevated amounts of suspended solids deposit on the substrate and limits its utility by these clean water indicators.

When aquatic life is partially impaired on this stream segment, the percentage of EPT taxa ranges from 8.6 - 16.0% (12.2% average). Total suspended solids concentrations are at moderate levels, averaging 42.2 mg/l. When suspended solids are graphed against flow for the time period between 1986 and 1998, the concentration of total suspended solids increases with high flows.

Desired endpoint for Mill Creek from 2004 - 2008

The use of biological indices allows assessment of the cumulative impacts of dynamic water quality on aquatic communities present within the stream. As such, these index values serve as a baseline of biological health of the stream. Sampling occurs during open water season (April to November) within the aquatic stage of the life cycle of the macroinvertebrates. As such there is no described seasonal variation of the desired endpoint of this TMDL. The endpoint would be average percent composition of EPT taxa of 25% or more over 2004-2008.

Achievement of this endpoint would be indicative of full support of the aquatic life use in the stream reach, therefore the narrative water quality standard pertaining to suspended solids would be attained.

3. SOURCE INVENTORY AND ASSESSMENT

Land Use: Population projections for Johnson County to the year 2020 indicate significant (65%) growth. (There are 578 to 1729 people per square mile in the county, and 24 percent of the watershed is urban). With the increase in population comes increased urban, residential and highway construction. Soil from exposed land runs-off into the streams, increasing the concentration of total suspended solids in streams.

Contributing Runoff: The watershed has an average soil permeability of 0.8 inches/hour according to NRCS STATSGO data base. Runoff would be produced under storms ranging in duration from one to six hours, having a recurrence interval of five, ten or twenty five years. Runoff is chiefly generated as infiltration excess with rainfall intensities greater than soil permeabilities. Generally, 29.8 percent of the watershed would generate runoff under dryer conditions or smaller storms. Moderate or wet conditions or larger storms would see runoff contributed from 65.0 to 93.4 percent of the watershed.

Background Levels: Background levels of total suspended solids come from geological sources. Sediment becomes suspended during high flow events as soil along the banks and stream bed is eroded.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

There is an indirect, yet un-quantified relation between sediment loading and biological integrity. Decreased loads should result in aquatic communities, indicative of improved water quality.
The characteristics of biological data to integrate the impacts of the entire watershed on the aquatic community defies allocation of specific loads between point and non-point sources. The relative presence of point and non-point activities has to be used to assess the relative contributions and responsibilities for sediment load reduction in the watershed. Therefore, allocations are made for this TMDL in a general sense to direct appropriate action, following in the belief that qualitative reduction in sediment loads will yield improved MBI values. More detailed allocations will be made in 2004 based on additional source assessment and establishment of quantitative relations between stream sediment and aquatic biology for this stream.

Point Sources: Based on the assessment of sources, point sources do not contribute to water quality impairment relative to sediment impacts on stream biology, and there will be no wasteload allocation.

Non-Point Sources: Given the runoff characteristics of the watershed, overland runoff can easily carry sediment from the watershed into the streams. The sporadic nature of the EPT values indicates that sediment impairment waxes and wanes over time, hinting that loadings are variable. As such, non-point sources are implicated as a primary source of these loadings. There are variety of sources contributing sediment to the stream. Additional assessment is necessary to quantify those contributions. At this point, the Load Allocation will be a reduction of sediment loadings such that average total suspended solids concentrations are below 100 mg/L in stream a majority of the time.

Defined Margin of Safety: In order to ensure that biological data collected in 2004-2008 are not skewed by a single sample with a high proportion of EPT taxa, the defined margin of safety will be a median value of EPT taxa percentages among samples taken over 2004 - 2008 which must exceed 25%. As an additional assurance of full support of the aquatic life use, the median percentage of individuals in a sample which are EPT taxa must exceed 20%.

State Water Plan Implementation Priority: Because this TMDL needs additional source assessment and definition of the relationship between aquatic community response and sediment

loading over the next five years, this TMDL will be a Medium Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Lower Kansas Subbasin (HUC 8: 10270104) with a priority ranking of 5 (Highest Priority for restoration work).

Priority HUC 11s and Stream Segments: Since it flows directly into the Kansas River, the main stem segment (HUC 170) should be the priority focus of implementation.

5. IMPLEMENTATION

Desired Implementation Activities

1. Implement and maintain conservation farming, including conservation tillage, contour strips and no till farming.
2. Install grass buffer strips along streams.
3. Reduce activities within riparian areas
4. Minimize road and bridge construction impacts on streams
5. Monitor wastewater discharges for excessive Total Suspended Solid loadings

Implementation Programs Guidance

NPDES - KDHE

a. Ensure proper monitoring, permitting, and operations of municipal wastewater systems to limit TSS discharge.

Non-Point Source Pollution Technical Assistance - KDHE

a. Support Section 319 demonstration projects for reduction of siltation runoff from agricultural or road construction activities

b. Provide technical assistance on practices geared to establishment of vegetative buffer strips.

c. Provide technical assistance on road construction activities in vicinity of streams.

Water Resource Cost Share Program - SCC

a. Apply conservation farming practices, including terraces and waterways

Non-Point Source Pollution Control Program - SCC

a. Provide sediment control practices to minimize erosion and sediment transport

Riparian Protection Program - SCC

a. Establish or reestablish natural riparian systems, including vegetative filter strips and streambank vegetation.

b. Develop riparian restoration projects

Buffer Initiative Program - SCC

a. Install grass buffer strips near streams.

b. Leverage Conservation Reserve Enhancement Program to hold riparian land out of production.

Extension Outreach and Technical Assistance - Kansas State University

a. Educate agricultural producers on sediment and pasture management

b. Provide technical assistance on buffer strip design and minimizing cropland runoff

Timeframe for Implementation: Management practices necessary to implement this TMDL beyond the initial emphasis should be deferred until 2004, pending additional source assessment and evaluation of biological data collected over 2000-2004.

Targeted Participants: Primary participants for implementation will be agricultural producers operating within the drainages of the priority subwatersheds. Initial work over 2000-2004 should include an inventory of activities in those areas with greatest potential to impact the stream, including, within a mile of the stream:

1. Total rowcrop acreage
2. Degree of residue compliance on Highly Erodible Lands
3. Acreage of poor rangeland or overstocked pasture
4. Livestock use of riparian areas
5. Unvegetated or graded roadside ditches
6. Construction projects without erosion control techniques

Some inventory of local needs should be conducted in 2000 to identify such activities. Such an inventory would be done by local program managers with appropriate assistance by commodity representatives and state program staff in order to direct state assistance programs to the principal activities influencing the quality of the streams in the watershed during the implementation period of this TMDL..

Milestone for 2004: The year 2004 marks the mid-point of the ten year implementation window for the watershed. At that point in time, adequate source assessment should be complete which allows an allocation of resources to responsible activities contributing to the sediment impairment. Additionally, biological data from Mill Creek over 2000-2004 should not indicate trends of reduced support of the aquatic community. Quantitative relationships between suspended sediment and biological measures should be established by 2004.

Delivery Agents: The primary delivery agents for program participation will be the conservation districts for programs of the State Conservation Commission and the Natural Resources Conservation Service. Producer outreach and awareness will be delivered by Kansas State Extension.

Reasonable Assurances:

Authorities: The following authorities may be used to direct activities in the watershed to reduce pollution.

1. K.S.A. 65-171d empowers the Secretary of KDHE to prevent water pollution and to protect the beneficial uses of the waters of the state through established water quality standards.

3. K.S.A. 2-1915 empowers the State Conservation Commission to develop programs to assist the protection, conservation and management of soil and water resources in the state, including riparian areas.

4. K.S.A. 75-5657 empowers the State Conservation Commission to provide financial assistance for local project work plans developed to control non-point source pollution.

5. K.S.A. 82a-901, et seq. empowers the Kansas Water Office to develop a state water plan directing the protection and maintenance of surface water quality for the waters of the state.

6. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan*.

7. The *Kansas Water Plan* and the Kansas-Lower Republican Basin Plan provide the guidance to state agencies to coordinate programs intent on protecting water quality and to target those programs to geographic areas of the state for high priority in implementation.

Funding: The State Water Plan Fund, annually generates $16-18 million and is the primary funding mechanism for implementing water quality protection and pollution reduction activities in the state through the *Kansas Water Plan*. The state water planning process, overseen by the Kansas Water Office, coordinates and directs programs and funding toward watersheds and water resources of highest priority. Typically, the state allocates at least 50% of the fund to programs supporting water quality protection. This watershed and its TMDL is a **Medium Priority** consideration.

Effectiveness: Sediment control has been proven effective through conservation tillage, contour farming and use of grass waterways and buffer strips. The key to success will be widespread utilization of conservation farming within the watersheds cited in this TMDL.

Should participation significantly lag below expectations over the next five years or monitoring indicates lack of progress in improving water quality conditions from those seen over 1990-1998, the state may employ more stringent conditions on agricultural producers in the watershed through establishment of a Critical Water Quality Management Area in order to meet the desired endpoints expressed in this TMDL.

6. MONITORING

KDHE will continue to collect seasonal biological samples from Mill Creek for three years over 2000 - 2004 and an additional three years over 2004-2008 to evaluate achievement of the desired endpoint. As quantitative relationships between sediment and biology are established, routine sampling at the Shawnee station for sediments should be evaluated over 2000-2008. Periodic monitoring of sediment content of wastewater discharged from treatment systems will be expected under reissued NPDES and state permits.

Additional source assessment needs to be conducted and local program management needs to identify its targeted participants of state assistance programs for implementing this TMDL. This information should be collected in 2000-2004 in order to support appropriate implementation projects

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the KLR Basin were held March 10, 1999 in Topeka, April 27 in Lawrence and April 29 in Manhattan. An active Internet Web site was established at http://www.kdhe.state.ks.us/tmdl/ to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Kansas-Lower Republican Basin.

Public Hearing: A Public Hearing on the TMDLs of the Kansas-Lower Republican Basin was held in Topeka on June 3, 1999.

Basin Advisory Committee: The Kansas-Lower Republican Basin Advisory Committee met to discuss the TMDLs in the basin on December 3, 1998; January 14, 1999; February 18, 1999; March 10, 1999; May 20, 1999 and June 3, 1999.

Discussion with Interest Groups: Meetings to discuss TMDLs with interest groups include:

Agriculture: November 10, 1998; December 18, 1998; February 10, 1999; April 10, 1999, May 4, 1999, June 8, 1999 and June 18, 1999.
Municipal: November 12, 1998, January 25, 1999; March 1, 1999; May 10, 1999 and June16, 1999.
Environmental: November 3, 1998; December 16, 1998; February 13, 1999; March 15, 1999, April 7, 1999 and May 3, 1999.
Conservation Districts: March 16-18, 24-25, 1999

Milestone Evaluation: In 2004, evaluation will be made as to the degree of implementation necessary within the watershed of the Mill Creek and its current condition of water quality.

Consideration for 303d Delisting: Mill Creek will be evaluated for delisting under Section 303d,

based on the monitoring data over the period 2004-2008. Therefore, the decision for delisting will come about in the preparation of the 2008 303d list. Should modifications be made to the applicable siltation criterion during the ten year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly.

Incorporation into Continuing Planning Process, Water Quality Management Plan and the Kansas Water Planning Process: Under the current version of the Continuing Planning Process, the next anticipated revision will come in 2002 which will emphasize revision of the Water Quality Management Plan. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in *Kansas Water Plan* implementation decisions under the State Water Planning Process after Fiscal Year 2004.

Approved January 26, 2000.